BIODIVERSITY MONITORING

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SHOUF BIOSPHERE RESERVE

Fighting Nubian ibexes (*Capra nubiana*)
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THE SHOUF MOUNTAIN LANDSCAPE COMPRISES THE SOUTHERN HALF OF MOUNT LEBANON AND THE ADJACENT WEST BEQAA FOOTHILLS.

It includes the Shouf Biosphere Reserve (SBR) - the largest protected area in the Mediterranean portion of the Middle East - with a size of 50,000 Ha and an elevation between 800 to 1,980 m ASL. The cultural landscape and its associated traditional practices can be summarised as follows:

- The high mountain zone with relic stands of cedar forests (*Cedrus libani*), all located in the western side of the mountain, oak forests (*Quercus brantii*; *Q. calliprinos*), as well as high mountain pastures and cushion shrub communities with scattered juniper trees on both sides of the slopes.
- The mid mountain zone with its rich mosaic of agro-silvo-pastoral systems, including:
  1. Traditional dry stonewall terrace systems with vineyards, olives and other fruit trees, mainly in the sea-facing western slopes.
  2. Highly diverse, semi-domesticated forests interspersed with pastures and agricultural land, including pines, oaks and cypress, which evolved from long-standing and complex domestication processes linked to eco-cultural practices that represent a cultural legacy from the past.

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Alliance for Mediterranean Nature & Culture

MAVA FONDATION POUR LA NATURE

Nubian ibex
(*Capra nubiana*)

1. OBJECTIVES

The overall objective of the initiative is to monitor biodiversity and assess the benefits of sustainable agricultural systems:

- Enhance the knowledge about the links between cultural practices and biodiversity.
- Demonstrate the positive impacts of sustainable practices (stonewall terraces and sustainable agriculture, sustainable grazing, forest management, collection of wild edible species) for the biodiversity of Shouf Biosphere Reserve.

SELECTED INDICATORS

- Insects (focus on bees, butterflies and ants)
- Reptiles
- Plants
- Birds

2. METHODS

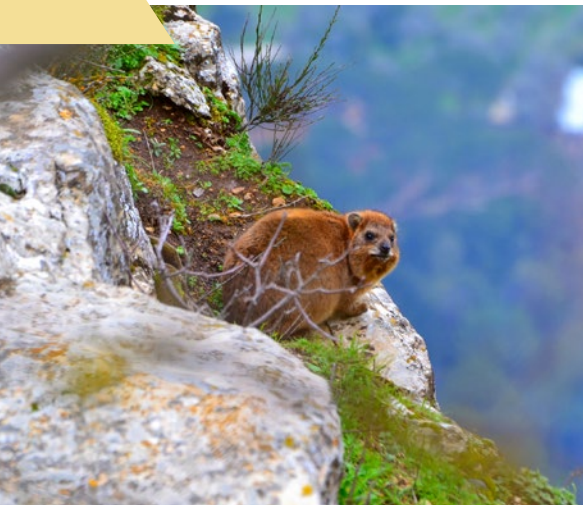
2.1. METHODS PHASE 1

Four different management types (intensively managed, lowly managed, abandoned and restored terraces) were chosen for 26 agricultural terrace sites in Al Shouf Cedar Nature Reserve/West Bekaa in Lebanon (Table 1). For each management type, there are at least 3 sites.

Greek tortoise (*Testudo graeca*) © Shouf Biosphere Reserve

		INTENSIVE CROPS	LOW INPUT CROPS	ABANDONED TERRACES	RESTORED TERRACES
	CROP	Apples (pears, peaches)	Olives (apples)		Various (fruits, herbs, vegetables...)
	PESTICIDES	✔ Frequent use	✔ ✖ Low or no use		✔ ✖ Low or no use
	IRRIGATION	✔ Conventional	✔ ✖ Convent or fainfed		✔ ✖ Convent or fainfed
	TILLAGE	✔ Deep	✔ ✖ Shallow or no		✔ Partial
	FERTILISERS	✔ Inorganic	✔ ✖ Manure or no		✔ Manure

Table 1. Information on the 4 different management types of the 26 agricultural terrace sites in Al Shouf Cedar Nature Reserve/West Bekaa in Lebanon (restored terraces only in Shouf). Source: © Shouf Biosphere Reserve



Rock hyrax (*Procavia capensis*) © Shouf Biosphere Reserve

2.1.1. INSECTS

METHODS FOR DATA COLLECTION

The data collection was conducted using pan traps and nets for sweeping at a bi-weekly basis at proposed sites and at control sites. In the trap, the insects were attracted by the use of vinegar. However, there was a problem with the vinegar, as it dried out quickly, thus affecting the quality of the samples. The samples were collected and sent to the lab of the Lebanese University for identification.

For butterflies, walking along transects was performed at a bi-weekly basis. The volunteers were given a manual with pictures for observation and identification of butterflies in the field. A total of 612 samples were collected from pan traps, resulting in 11 families, and another 1873 samples were collected from sweeping, resulting in 15 families.

BIOLOGY SAMPLE COLLECTOR

The field team downloaded a smartphone application that facilitated documentation by adding photographs and GPS positions, transferring the data collected by email or website, submitting questionnaires, and sharing data with other app users.

SAMPLING PRESSURE

Sampling data from agriculture terraces (13 sites) and pastures (3 sites) over a period of 7 months (May-November).

2.1.2. REPTILES

METHODS FOR DATA COLLECTION

The data collection was conducted using net traps. The traps were monitored on a weekly basis, as the traps were being eaten by rats. The monitoring team used observation to compensate for the losses: visual monitoring for 30 minutes and the recording of every reptile observed. This proved to be useful for the reptiles related to terraces and stonewalls. A total of 10 reptile species were found from 70 samples.

SAMPLING

Sampling data from agriculture terraces (13 sites) and pastures (3 sites) over a period of 7 months (May-November).

2.1.3. BIRDS

METHODS FOR DATA COLLECTION

Monitoring of birds was controversial because their observation is recommended at a landscape level and not at the small site level where the other monitoring activities took place. It is important to note that the farmlands in the Shouf Biosphere Reserve are rather small in size (average of 2,500 sq meter).

The data collection was conducted through point counts at a bi-weekly basis at proposed the sites and at control sites. A total of 15 bird species were recorded from a record of 45.

SAMPLING

Sampling data from agriculture terraces (13 sites) and pastures (3 sites) over a period of 7 months (May-November).

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Lebanese cedar (*Cedrus libani*) © Shouf Biosphere Reserve

2.1.4. PLANTS

METHODS FOR DATA COLLECTION

The collection of plants is conducted using the quadrant method on a bi-weekly basis. A large number of plants was collected, but there was a lack of availability of experts to identify the plants. Another method of data collection was through walking along the transects (Edge effect). The plants were dried and then identified and classified. A total of 200 plant species were found from 500 samples.

SAMPLING

Sampling data from agriculture terraces (13 sites) and pastures (3 sites) over a period of 7 months (May-November).

2.1.5. ANALYSIS OF PHASE 1

In addition to the shortfalls of some monitoring schemes explained, the results of Phase 1 show that the experimental design set up (that is, the choice of the 4 managements, the choice of 3 sites per management, the selection of the sites) appears robust. In fact, according to a cluster analysis and to an analysis of similarity (ANOSIM), the composition of the insect communities analysed (i.e. ants, butterflies and hemipterans) is similar within each identified management. However, and because site characterization was broad and the number of sites (constrained by the available resources) was low, we could not directly relate each level of management (ploughing depth, type of watering and so on) to a level of diversity.

But very generally speaking, abandoned sites and restored terraces display a higher diversity and (mostly) cluster together, suggesting similar communities, while low input and and intensive sites are in certain cases hard to disentangle. Another observation was that recently restored terraces still keep biodiversity elements close to what used to be the abandoned situation and the task will be to ensure the maintenance of high biodiversity values through environmentally-sound management practices, and monitor how much the proposed management interventions (or the applied management interventions, as farmers may not properly follow the propose guidelines) support high biodiversity values in the long-term.

Given all of these remarks and the unanimous agreement of the experts and field team, the monitoring scheme was simplified for the second phase, and monitoring limited to plants and pollinators.

2.2. METHODS PHASE 2

The monitoring protocols were updated based on the results of Phase 1, and the staff underwent several theoretical and practical training sessions on monitoring biodiversity. They completed 8 rounds of data collection.

Monitoring of flora consisted mainly of observation, and monitoring of habitats and micro-habitats unless a new plant was observed or confirmation was needed. Monitoring of pollinators is done through observation, linking them with plant species

INNOVATION

1. Linking plants and practices to pollinators
2. Development of a tool for self-assessment for farmers including biodiversity

3. REFERENCES

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4. CONTACT

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IUCN Centre for Mediterranean Cooperation

https://www.iucn.org/our-work/region/mediterranean

Tour du Valat

https://tourduvalat.org/

MAVA Foundation

https://mava-foundation.org/oaps/promoting-sustainable-land-use-practices-2/

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